Optimal Testing/Maintenance Design in a Software Development Project

Koichiro RINSAKA[†] and Tadashi DOHI[†]
[†]Department of Information Engineering, Hiroshima University,
1-4-1 Kagamiyama, Higashi-Hiroshima 739-8527, Japan.

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Abstract: It is important to determine the optimal time when software testing should be stopped and when the system should be delivered to a user or a market. This problem, called *optimal software release problem*, plays a central role for the success or failure of a software development project. Once the software is released to users, the software failures may occur even in the operational phase. It is common for software developers to provide maintenance service during the period when they are still responsible for fixing software faults causing failures. In order to carry out the maintenance in the operational phase, the software developer has to continue keeping a software project team. At the same time, it is required that he/she should reduce the management cost in the operational phase and should utilize human resources effectively.

In this paper, we formulate the total expected software cost incurred to the software developer until the end of software life cycle. We derive the optimal testing period (release time) which minimizes the total expected software cost. We call the time length to complete the operational maintenance after release *a planned maintenance limit*, and derive the optimal planned maintenance limit which minimizes the total expected software cost. Through numerical examples, we calculate the joint optimal policy combined by testing period and planned maintenance limit.

Keywords: Software reliability, optimal release problems, planned maintenance limit, operational profile, total expected software cost, non-homogeneous Poisson process.

Correspondence to: Mr. K. Rinsaka, Department of Information Engineering, Hiroshima University,
1-4-1 Kagamiyama, Higashi-Hiroshima 739-8527, Japan; Tel. +81-82-424-7696; Fax. +81-82-422-7195;
E-mail. {rinsaka, dohi}@rel.hiroshima-u.ac.jp